



**National Center
for
Dental Hygiene
Research &
Practice
(NCDHRP)**

**DENTAL
HYGIENE
RESEARCH
TOOLKIT**

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NCDHRP Dental Hygiene Research Toolkit

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Introduction

The National Center for Dental Hygiene Research and Practice (NCDHRP) About the Center: Mission, Goals and Projects

The National Center for Dental Hygiene Research was established through a 3-year grant from the Bureau of Health Professions (BHP), U.S. Department of Health and Human Services in 1993. Development of the Center has been based on a collaborative model that brings researchers, educators and clinicians together to develop and conduct studies related to national dental hygiene research priorities (<http://www.adha.org/research-center>). A national panel of dental hygiene leaders and accomplished researchers serve in an advisory capacity.

Mission

The mission of the National Center for Dental Hygiene Research & Practice (NCDHRP) is to promote the health of the public by fostering the development, implementation and dissemination of oral health research; establishing an infrastructure to support dental hygiene research; and, strengthening the scientific foundation for the discipline of dental hygiene.

Goals

1. Increase awareness of dental hygienists' contributions to multidisciplinary healthcare research.
2. Serve as an authoritative source on dental hygiene practice and outcomes research.
3. Create and facilitate opportunities that promote leadership and scholarship.
4. Foster research efforts that address the objectives of oral health research agendas.
5. Promote the translation of research evidence so that it is meaningful and useful in dental hygiene education and practice.

Research Toolkit

This publication addresses, in part, the Center's mission and goals of fostering dental hygiene research and promoting translation of research evidence. The purpose of the Research Toolkit is to provide a listing of available resources relevant to dental hygiene research. Although this compilation is not intended to be comprehensive, it provides a selection of tools and resources that can help scholars (particularly in dental hygiene) conduct research more efficiently or creatively. It provides a directory of tools organized by research activity.

Overview of the Research Process

1. Designing the Research Plan

- Identifying a broad area of interest and potential problem(s)
- Conducting an initial literature review to narrow the focus of the research and problem to be studied and determine a theoretical approach
- Defining and formulating the specific research problem
- Continuing a more comprehensive literature review to fully understand what is known and where gaps in knowledge exist
- Stating the hypothesis or research question(s)
- Selecting the research approach and potential valid and reliable measuring instruments
- Seeking statistical consultation regarding sample size, study design, and general plan for data analysis
- Identifying the population, sample, sampling and recruitment strategy as well as planning for protection of subjects as needed
- Designing the methods including investigator training or calibration, selection and administration of data collection instruments and plan
- Finalizing the data analysis plan: data entry, management, and storage

2. Conducting the Study

- Conducting a pilot study as needed
- Implementing the research plan
 - Subject recruitment and enrollment
 - Data collection
 - Analysis and interpretation
- Preparing the research report

Adapted from Darby and Bowen (1983) Research Methods for Oral Health Professionals.

Selected Research Methods Textbooks

1. Blessing, DJ & Forister JG. Introduction to Research and Medical Literature for Health Professionals (3rd ed.). Jones and Bartlett Learning; 2012.
2. Gallin JL & Ognibene FP. Principles and Practice of Clinical Research (3rd ed.). San Diego: Elsevier; 2012.
3. Giannobile WV, Burt BA, Genco RJ. Clinical Research in Oral Health. John Wiley & Sons; 2010.
4. Glanz, Timer and Lewis. Health Behavior and Health Education: Theory, Research and Practice 3rd ed. Jossey-Bass; 2008.
5. Jacobsen KH. Introduction to Health Research Methods: A Practical Guide. Sudbury, MA: Jones & Bartlett Learning; 2012.
6. Leedy PD & Ormrod JE. Practical Research: Planning and Design (9th ed.). Upper Saddle River, NJ: Pearson; 2010.
7. Portney LG & Watkins MP. Foundations of Clinical Research. Applications to Practice. (3rd ed.). Upper Saddle River, NJ: Pearson Education Inc; 2009.
8. Patten ML. Understanding Research Methods: An Overview of the Essentials. Glendale, CA: Pycszak Publishing; 2014.

Research Ethics and Protocol Requirements

Research ethics and integrity promote the aims of research such as knowledge, integrity, objectivity, and accuracy. Research involves a great deal of collaboration among many different people in different disciplines and settings, therefore, principles of trust, respect, openness, and fairness are needed. Respecting intellectual property rights and decisions pertaining to authorship also are important considerations. Ethical norms and protocol requirements help to ensure accountability in research and build public support for research. Protocol requirements, rules, and policies have been developed by government agencies, institutions, and professional associations to govern or guide research ethics.

Source: Resnick DB. (2011) *What is ethics in research and why is it important?*
<http://www.niehs.nih.gov/research/resources/bioethics/whatis/>

Some examples and training resources follow.

Training in Research Ethics

The Collaborative Institutional Training Initiative (CITI Program) at the University of Miami provides online research education content. <https://www.citiprogram.org/>

1. Human Subjects Research (HSR) – includes two different courses for biomedical researchers and social, behavioral, and educational discipline; each course covers the historical development of human subjects protections as well as current information on regulatory and ethical issues.
2. Good Clinical Practice (GCP) – includes three courses regarding different types of clinical research for research teams involved in clinical trials of drugs, biologics, and devices.
3. Information Privacy and Security (IPS) – provides information regarding the ethics of data protection, focusing on the healthcare-related privacy and information security protections of the Health Insurance Portability and Accountability Act (HIPAA).
4. Responsible Conduct of Research (RCR) – provides courses for specific disciplines including the biomedical sciences, engineering, the humanities, the physical sciences, and the social, behavioral and education sciences, as well as a course regarding financial conflicts of interest.
5. Biosafety and security (BSS) – covers the principles of biosafety and biosecurity, including safe use and containment of biohazardous agents.
6. Animal Care and Use (ACU) – principles of ethical care and use of animals in research, training, and testing, as well as the care and use of certain species.
7. Export Control (EC) – addresses research activities involving devices, materials, or technologies that are subject to U.S. legal-regulatory controls.

Recommendations for the Conduct, Reporting, Editing, and Publication of Scholarly Work in Medical Journals. International Committee of Medical Journal Editors. Dec.2013
<http://icmje.org/>

Research Ethics and Protocol Requirements (continued)

Online Research Ethics Course

http://ori.hhs.gov/education/products/montana_round1/research_ethics.html

This course includes six sections regarding research ethics. Each independent section includes an introduction that identifies learning goals, major issues for discussion, at least one case study, external links, and an examination on the concepts covered.

1. Ethical Issues in Research: A Framework

- Compliance and Ethics
- Compliance Concepts
- Ethics Concepts

2. Interpersonal Responsibility

- Mentor/Trainee Responsibilities
- Determining Publication Practices and Responsible Authorship
- Collaborative Science/Competitive Science

3. Institutional Responsibility

- The Institutional Process Regarding Allegations
- Conflicts of Interest and Conflicts of Commitment
- IRB/IACUC

4. Professional Responsibility

- Proposing Research
- Dissemination of Findings
- Peer Review

6. Animals in Research

7. Human Participation in Research

Research Ethics Online Training - Global Health Trials

<https://globalhealthtrials.tghn.org/elearning/research-ethics/>

Research Ethics Online Training is adapted from an online learning course and resource package designed and produced by the World Health Organization (WHO). The WHO granted permission for the adaptation of this resource in a format and platform that is accessible to all. It includes the following 14 modules:

1. [Introduction to Research Ethics](#)
2. [Principles and Guidelines](#)
3. [Evaluating Risks and Benefits](#)
4. [Issues in Study Design](#)
5. [Understanding Vulnerability](#)
6. [Obligations to Research Participants](#)
7. [Engaging with Communities](#)
8. [Privacy and Confidentiality](#)
9. [Informed Consent](#)
10. [Other Ethical Issues](#)
11. [Biobanks and genomic research](#)
12. [Including people with disabilities](#)
13. [Women in Biomedical Research](#)
14. [Research in Public Health Emergencies](#)

Research Ethics and Protocol Requirements (continued)

Canadian Government Panel on Ethics: The TCPS 2 Tutorial Course on Research Ethics

<http://www.pre.ethics.gc.ca/eng/education/tutorial-didacticiel/>

CORE is a self-paced course providing an applied approach to the TCPS 2. It features interactive exercises and multi-disciplinary examples. CORE has eight modules ranging from Core Principles to REB Review. It is designed primarily for researchers – though anyone may take this course and print their own certificate of completion.

Protecting Human Research Participants (PHRP)

<https://phrp.nihtraining.com/users/login.php>

Jointly sponsored by University Health Services Professional Education Programs (UHS–PEP) of Virginia Commonwealth University Health System (Continuing Medical Education) and the Office of Extramural Programs, Office of Extramural Research, NIH. This course is designed to prepare investigators involved in the design and/or conduct of research involving human subjects to understand their obligations to protect the rights and welfare of subjects in research. The course material presents basic concepts, principles, and issues related to the protection of research participants.

International Ethical Guidelines for Biomedical Research Involving Human Subjects

http://www.cioms.ch/frame_guidelines_nov_2001.htm (1 de 64)0/03/2007 9:10:05

Office of Research Integrity (ORI) Division of Education and Integrity

<http://ori.hhs.gov/print/division-education-and-integrity>

The Division of Education and Integrity (DEI) is primarily responsible for implementing the education and prevention missions of ORI. DEI is responsible for:

1. Developing and implementing, in consultation with the PHS OPDIVs, activities and programs for PHS intramural and extramural research to teach the responsible conduct of research, promote research integrity, prevent research misconduct, and to enable the extramural institutions and PHS OPDIVs to respond effectively to allegations of research misconduct;
2. Coordinating the dissemination of research integrity policies, procedures, and regulations;
3. Conducting policy analyses, evaluations, and research to improve DHHS research integrity policies and procedures and build the knowledge base in research misconduct, research integrity, prevention;
4. Administer programs for: approval of institutional assurances and review and approval of intramural and extramural policies and procedures.

Source: *Statement of Organization, Functions, and Delegations of Authority, Federal Register: May 12, 2000 (Volume 65, Number 93, Pages 30600-30601).*

Research Ethics and Protocol Requirements (continued)

Clinical Research Protocol Requirements, Guidelines, and Training

International Conference on Harmonisation (ICH) Guidance Documents:

<http://www.fda.gov/regulatoryinformation/guidances/ucm122049.htm>

Guidance documents represent the US Food and Drug Administration's (FDA) current thinking on a topic. They do not create or confer any rights on any person and do not operate to bind FDA or the public. You can use an alternative approach if the approach satisfies the requirements of the applicable statutes and regulations.

Clinical Trial Guidance Documents (FDA)

<http://www.fda.gov/RegulatoryInformation/Guidances/ucm122046.htm>

A good resource on Good Clinical Practice Standards for clinical researchers.

Clinical Trials.gov

<http://clinicaltrials.gov/>

A user-friendly register of federally funded and privately sponsored clinical trials; resource for clinical researchers and clinicians wanting to find clinical trials

Clinical Research Training: National Institutes of Health

<http://clinicalcenter.nih.gov/training/training/crt.html>

This training program is offered to anyone interested. Upon successful completion, a certificate of completion is issued. The computer-based training program is a requirement for Principal Investigators of NIH Intramural Research Program (IRP) protocols. This CBT is designed to help you understand and comply with applicable requirements when conducting research involving human subjects. Upon completion of this course you will be aware of and understand the following:

1. Ethical issues involved in human subjects research
2. Roles and responsibilities of the investigator and institution when conducting clinical research in the NIH intramural research program
3. FDA oversight of clinical research
4. How developments in science and health are reported by the media and how to work effectively with reporters

Summer Institute in Clinical Dental Research Methods

<http://depts.washington.edu/dphs/suminst/>

The University of Washington offers a Summer Institute in Clinical Dental Research Methods for dental school faculty and other oral health professionals interested in clinical research. Courses include biostatistics, clinical epidemiology/study design, personal computing applications, clinical trials, behavioral research in dentistry, grantsmanship, and case studies in data analysis.

Review of the Literature

The literature review can be limited in scope, for evidence-based decision making, or comprehensive in relation to a given topic area of scholarly inquiry. Using evidence from the medical literature to answer clinical questions and make decisions regarding best practices originated at McMaster University, Ontario, Canada in the 1980's. Today, evidence-based practice, or integrating the best research evidence with a health care professionals' expertise and the patient's specific conditions and preferences, is the standard of care. In research, an in-depth literature review is used to define the state of the art, formulate a research question or hypothesis, identify the significance of the research, and link the proposed research project or research findings to the existing body of knowledge.

The review of the literature involves searching databases for the most current, relevant, high quality, and credible publications. Several online databases exist; however, some are more commonly employed by dental hygiene researchers than others. Regardless of the source used, the individual research studies and meta-analyses or systematic reviews found must be critically appraised by the reviewer to assess significance of the findings, strengths and weaknesses, recommendations for future study, and where gaps might exist in the knowledge base. As the desired literature search is compiled, the researcher synthesizes the information, determining how individual studies relate to and advance theory. Scientific writing and dissemination of research findings are topics addressed in the last section of this Dental Hygiene Research Toolkit.

Distinction Between a Literature Review and a Systematic Review

Systematic reviews (SRs) differ from traditional literature or narrative reviews in that they are narrower in scope and focus on answering a specific question. Those conducting SRs try to find all the literature addressing a specific question. Studies selected for inclusion in a SR must meet specific pre-defined criteria, such as the type of research design used, sample selection, length of study, and outcome variables of interest. In contrast, a traditional literature or narrative review serves a different purpose in that it deals with a broad range of issues on a given topic rather than answering a specific question in depth. Literature reviews also provide a more subjective assessment in that literature can be selected to support a desired conclusion. A comparison of SRs and literature reviews is illustrated in Table on the following page.

The following is a partial listing of resources related to literature reviews conducted for evidence-based practice and scholarly research.

Evidence Based Practice

1. Von Isenburg M, Handler L. Introduction to evidence-based practice. Duke University Medical Library and UNC Health Sciences Library, NC; June 2013. (<http://guides.mclibrary.duke.edu/ebmtutorial>).
2. Forrest JL, Miller SA, Overman PR, Newman MJ. Evidence-based Decision Making: A translational guide for dental professionals. Lippincott, Williams & Wilkins; 2009.
3. Evidence based decision-making: <http://www.usc.edu/ebnet>
4. Evidence Based Dentistry Library: <http://ebdLibrary.com>
5. Wilson Dental Library, Evidence-Based Decision Making, <http://wilson.usc.libguides.com/EBD>
6. Forrest JL. EBDM: Intro and Formulating Good Clinical Questions, course #311; Access via <http://www.dentalcare.com/en-US/conteduc/index.aspx>
7. Miller SA, Forrest JL. Searching the Literature Using PubMed, course #340; Access via <http://www.dentalcare.com/en-US/conteduc/index.aspx>

Review of the Literature (continued)

Comparison of Characteristics of a Systematic Review and a Traditional Literature Review

<i>Characteristic</i>	Systematic Review	Traditional Narrative Review of the Literature
Focus of the Review	<ul style="list-style-type: none"> • Specific problem or patient question; • Narrow focus • Example: Effectiveness of fluoride varnish as compared to topical SnF fluoride in preventing root caries. 	<ul style="list-style-type: none"> • Range of issues on a topic • Broad focus • Example: Measures for preventing root surface caries; can include many types of FI; may not make comparisons between methods
Who conducts	Multidisciplinary team	Individual
Selection of studies to include	<ul style="list-style-type: none"> ▪ Pre-established criteria based on validity of study design and specific problem. ▪ All studies that meet criteria are included. ▪ Systematic bias is minimized based on selection criteria 	<ul style="list-style-type: none"> ▪ Criteria not pre-established or reported in methods. Search on range of issues. ▪ May include or exclude studies based on personal bias or support for the hypothesis, if one is stated. ▪ Inherent bias with lack of criteria.
Reported findings	<ul style="list-style-type: none"> ▪ Search Strategy & Databases Searched ▪ Number of studies that met criteria; number that did not meet and why studies were excluded ▪ Description of study design, subjects, length of trial, state of health/ disease, outcome measures 	<ul style="list-style-type: none"> ▪ Literature presented in literature review format and crafted by the individual author. ▪ Search strategy, databases, total number of studies pro and con not always identified ▪ Descriptive in nature reporting the outcomes of studies rather than their study designs
Synthesis of Selected Studies	<ul style="list-style-type: none"> ▪ Critical analysis of included studies ▪ Determination if results could be statistically combined, and if so, how meta-analysis was conducted 	<ul style="list-style-type: none"> ▪ Reporting of studies that support a procedure or position and those that do not rather than combining data or conducting a statistical analysis.
Main Results	<ul style="list-style-type: none"> ▪ Summary of trials, total # of subjects ▪ Definitive statements about the findings in relation to the specified objectives and outcome measures 	<ul style="list-style-type: none"> ▪ Summary of the findings by the author in relation to the purpose of the literature review and specific objectives
Conclusions or Comments	<ul style="list-style-type: none"> ▪ Discussion of the key findings with an interpretation of the results, including potential biases and recommendations for future trials 	<ul style="list-style-type: none"> ▪ Discussion of the key findings with an interpretation of the results, including limitations and recommendations for future trials

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Review of the Literature (continued)

Literature Reviews and Critical Appraisal

1. Galvan JL. Writing literature reviews: A guide for students of the social and behavioral sciences (4th ed.). Glendale, CA: Pyczak Publishing; 2009.
2. Mongan-Rallis H. Guidelines for writing a literature review. April 21, 2014, www.duluth.umn.edu/~hrallis/.../litreview.html
3. Miller SA, Forrest JL. Translating Evidence-Based Decision Making into Practice: Appraising and Applying the Evidence. *J Evid Base Dent Pract.* 2009;9:164-182.
4. Sutherland SE. Evidence-based Dentistry: Part VI. Critical Appraisal of the Dental Literature: Papers about Diagnosis, Etiology and Prognosis. *J Can Dent Assoc.* 2001, Nov;67(10):582-5.
5. Riegelman RK. Studying A Study and Testing a Test: Reading Evidence-based Health Research 6th ed. Lippencott Williams & Wilkins, Philadelphia PA; 2013.
6. CASP (Critical Appraisal Skills Programme): <http://www.casp-uk.net/>

Databases for Searching the Literature

1. PubMed (MEDLINE) – PubMed comprises more than 23 million citations for biomedical literature from MEDLINE, life science journals, and online books. Citations may include links to full-text content from source websites.
2. EBSCO Host – EBSCO provides a complete research solution comprised of [research databases](#), [e-books](#) and e-journals to support the information and collection development needs of libraries and other institutions and to maximize the search experience for researchers and other users.
3. Cochrane Library – This resource is excellent for high quality systematic literature reviews. It is a collection of six databases that contain different types of high-quality, independent evidence to inform healthcare decision-making.
4. CINAHL – The Cumulative Index to Nursing and Allied Health Literature provides an index of nursing and allied health journals, including dental hygiene journals, with millions of records beginning in 1981.
5. Scopus – This database is valuable for interdisciplinary research and has peer-reviewed journals, conference proceedings, open-source journals.
6. Web of Science – This interdisciplinary database is useful for topics such as ethics, anxiety, health psychology, and behavioral research.
7. ERIC – The Education Resources Information Center is an online library of education research and information, sponsored by the Institute of Education, thus it is focused on topics and resources related to education.
8. PsychInfo – This database is an expansive abstracting and indexing database with more than 3 million records devoted to peer-reviewed literature in the behavioral sciences and mental health.
9. OVID – A privately-owned interface using MEDLINE with the advantage of searching different databases in several disciplines using the same interface.

Citation Management Software

Citation software programs assist researchers with importing citations from databases and websites, building and organizing references in specific topics or areas of study, formatting citations for papers in various styles and formats, saving and organizing information obtained during searches such as PDFS, screenshots, illustrations and images. Several programs are available including but not limited to:

1. EndNote
2. RefWorks
3. Zotero
4. Mendeley

Selection of citation management software requires consideration of which program(s) the research team members prefer to use. Content also can be transferred from one software program to another.

Source: <http://libguides.mit.edu/references>

Research Design and Methods

The research process follows the same steps regardless of the type of research employed. Resources available to guide the process and provide information about research design and methods are virtually unlimited. The following resources have been recommended by the Advisory Panel to the National Center of Dental Hygiene Research & Practice; therefore, they represent a selection of potential resources for the dental hygiene researcher. (See also Overview of Research Process, Selected Research Texts.)

Research Design

What is Research Design?

www.nyu.edu/classes/bkg/methods/005847ch1.pdf

Applied Research Design

<http://steinhardt.nyu.edu/scmsAdmin/uploads/005/562/Syllabus%20E27.2013.pdf>

Design Web Center for Social Research Methods

<http://www.socialresearchmethods.net/kb/design.php>

The Task Force on Design and Analysis in Oral Health Research

<http://www.taskforceondesign.org/index.php>

- Maximize validity and efficiency on oral health clinical research by fostering and promoting the use of sound and innovative methodologies in design and analysis.
- Encourage and promote a continuous dialog, bridging quantitative and clinical issues among stakeholders in oral health research.

Guide to Research Methods, The Evidence Pyramid

<http://library.downstate.edu/EBM2/2100.htm>

Clinical Research

(See also Research Ethics and Protocol Requirements)

Clinical Trial Guidance Documents (FDA)

<http://www.fda.gov/RegulatoryInformation/Guidances/ucm122046.htm>

Clinical Trials.gov - <http://clinicaltrials.gov/>

Summer Institute in Clinical Dental Research Methods

<http://depts.washington.edu/dphs/suminst/>

Manolio T. Design and Conduct of Observational Studies and Clinical Trials. In: Gallin J, editor. Principles and Practice of Clinical Research. Academic Press, Elsevier, 2002: 187-206.

Data Collection Resources

Inter-university Consortium for Political and Social Research: Datasets (Health Related)

<http://www.icpsr.umich.edu/icpsrweb/ICPSR/studies?classification=ICPSR.IX>.

Research Design and Methods (continued)

Rand Health Survey and Tools - http://www.Rand.org/health/surveys_tools.html

Research Tools and Data Sources: Agency for Healthcare Research and Quality (AHRQ)
<http://www.ahrq.gov/research/> and <http://www.ahrq.gov/research/data/dataresources/index.html>

Largest collection of longitudinal hospital care data in the US. National and State databases on inpatient, emergency department and ambulatory surgery visits as well as information from reports and tools facilitate research on a broad range of health policy issues.

Health Services Research Information Central, Data, Tools and Statistics.

National Institutes of Health US National Library of Medicine.

<http://www.nlm.nih.gov/hsrinfo/datasites.html>

HSR Information Central is not an index of all health services resources on the Web. Rather, it contains selective links representing a sample of available information. Items are selected for their quality, authority of authorship, uniqueness, and appropriateness.

NIDCR's National Dental Practice-Based Research Network (NDPBRN)

www.nidcr.nih.gov/Research/DER/ClinicalResearch/DentalPracticeBasedResearchNetwork/

Examiner Training and Calibration

Lang NP, Cullinan MP, Holborow DW, Heitz-Mayfield LJA. Examiner training and calibration: Standardization and calibration in periodontal studies. In Clinical Research in Oral Health, Wiley-Blackwell, Publishers New York. Editors: Giannobile WV, Burt BA and Genco RJ; 2010.

Hefti AF, Preshaw PM. Examiner alignment and assessment in clinical periodontal research. Periodontol 2000. 2012;59(1): 41-60.

Survey Research

Dillman DA. Mail and Internet Surveys: The Tailored Design Method -- 2007 Update with New Internet, Visual, and Mixed-Mode Guide. John Wiley and Sons: Hoboken, NJ; 2007.

Aday LA, Cornelius LJ. Designing and Conducting Health Surveys, A Comprehensive Guide Jossey-Bass; 2006. The definitive resource for principles that should be used in designing high-quality surveys.

Survey Research. Web Center for Social Research Methods

<http://www.socialresearchmethods.net/kb/survey.php>

Indiana University Bloomington. Center for Survey Research

<http://csr.indiana.edu/>

Research Design and Methods (continued)

Qualitative Research

Antioch University's Online Qualitative Research Resources Home

<http://www.antiochne.edu/clinical-psychology/qr/>

The Qualitative Research Web Ring

<http://www.qualitativeresearch.uga.edu/QualPage/>

University of Wisconsin-Madison Center for Clinical and Translational Research

<https://sites.google.com/a/wisc.edu/qualitative-and-mixed-methods-resources/>

Systematic Reviews and Meta-analysis

Cochrane Handbook for Systematic Reviews of Interventions

<http://www.cochrane.org/handbook>

PRISMA: Transparent Reporting of Systematic Reviews and Meta-Analyses

PRISMA Statement, Checklist and Flow Diagram

<http://www.prisma-statement.org/statement.htm>

Anywhere Systematic Review, The Cochrane Library

www.thecochranelibrary.com/view/0/AnywhereSR.html

As a member of the scientific community, you know how important it is to have access to that data, whenever you need it, and wherever you are, in any format, and with any device.

Uman L. Systematic Reviews and Meta-Analyses. J Can Acad Child Adolesc Psychiatry. Feb 2011;20(1):57-59.

Akobeng AK. Understanding systematic reviews and meta-analysis. Arch Dis Child 2005;90:845-848 Doi:10.1136/adc.2004.058230

Data Analysis

Holcomb ZC. SPSS Basics: Techniques for a First Course in Statistics. Glendale CA: Pycszak Publishing; 2013.

Pycszak F. Making Sense of Statistics. A Conceptual Overview. Glendale CA: Pycszak Publishing; 2010.

Abt E. Understanding Statistics series, 1-6, Evidence-Based Dentistry journal, **2010**: 11: 60-61; 93-94; 118; 2011: 12: 25-27; 57-58; and 2012:13:29-31, published by Nature.

Trisha Greenhalgh. How to read a paper series, Statistics for the Non-statistician.

- **Part I: Different types of data need different statistical tests.** BMJ 1997; 315: 364-366. <http://bmj.com/cgi/content/full/315/7104/364>
<http://www.bmj.com/content/315/7104/364.full#alternate>
- **Part II: Significant relations and their pitfalls.** BMJ, August 16, 1997; 315(7105): 422-425. <http://bmj.com/cgi/content/full/315/7105/422>

Scientific Writing and Dissemination of Research Findings

The old saying is, “If it isn’t published, it never happened.” This statement might be exaggerated, but it does reflect the importance of disseminating research findings. Most investigators think immediately of the manuscript as **the** means of dissemination, and it is an important one for many reasons. There are, however, many ways that research findings can and should be disseminated.

A dissemination plan should be made in the planning stages of the study with consideration given to the many audiences that might have interest in or benefit from the research findings. Deficiencies in the dissemination and transfer of research-based knowledge into routine clinical practice continue to be a challenge. Dissemination planning tools have been developed by CARE, the Yale Center for Clinical Investigation, and by The US Department of Health and Human Services Agency for Healthcare Research and Quality. They suggest considering all of the project’s stakeholders, partners, and end users including study participants and interested parties at the local, state and national levels. The scientific manuscript(s), a research summary document, flyers, posters, research briefs, newsletters, information in professional association publications, social media announcements, press conferences, and conference or workshop presentations are means of dissemination.

Most of these avenues for dissemination require strong writing skills. In addition, for manuscripts, authors must consider guidelines for publishing particular types of studies, for example meta-analyses and systematic reviews, clinical trials and epidemiological studies. Author guidelines for each journal are available, and these requirements generally include a specific writing and citation style manual to follow. The following lists represent a small sample of available resources.

Writing Resources

1. Pyczak F, Bruce RR. Writing empirical research reports: A basic guide for students of the social and behavioral sciences (7th ed.). Glendale CA: Pyczak Publishing; 2011.
2. PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses, formerly QUOROM): <http://www.prisma-statement.org/>
3. CONSORT (Consolidated Standards of Reporting Trials): <http://www.consort-statement.org>
4. STROBE Guidelines: “Strengthening Reporting of Observational Studies in Epidemiology.” <http://download.journals.elsevierhealth.com/pdfs/journals/0895-4356/PIIS0895435607004362.pdf>
5. Gopen G, Swan J. The Science of Scientific Writing. American Scientist; Nov-Dec, 1990. <http://www.americanscientist.org/issues/id.877,y.0,no.,content.true.page.1,css.print/issue.aspx>
6. Strunk W, White EB, Angell R. New International Edition. The Elements of Style. Pearson Education Limited. Essex, England; 2014.
7. Purdue University Online Writing Lab (OWL) <https://owl.english.purdue.edu/>

Scientific Writing and Dissemination of Research Findings (continued)

Scientific Oral Presentations

1. Alley M. The Craft of Scientific Presentation: Critical Steps to Succeed and Critical Errors to Avoid. 2nd ed. Springer Science and Business Media: New York; 2013.
2. Davis A, Davis K, Dunagan M. Scientific Papers and Presentations. 3rd ed. Academic Press, Elsevier; 2013.
3. Stanford School of Medicine. Program on Prevention Outcomes and Practices. Posters and Oral Presentations. <http://ppop.stanford.edu/ResearchPresentations.html>
4. OWL Purdue Writing Lab. Designing an Effective PowerPoint Presentation: Quick Guide. <https://owl.english.purdue.edu/owl/resource/686/01/>

Style Manuals

1. American Psychological Association. Publication Manual of the American Psychological Association. 6th ed. Washington: APA; 2010.
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The DHNet

Explore the DHNet at <http://www.usc.edu/dhnet>

The **dhnet** serves as the home base for the National Center for Dental Hygiene Research & Practice (NCDHRP or Center) and your connection to research resources that support dental hygiene education, practice and research. Within each of the sections there are several categories and quick links to major resources for your convenience. Also, each section has links to training programs, many of which are online and can be accessed at your convenience. Learn more about the Center and our research projects, educational and faculty development programs, and opportunities for you to volunteer to be part of studies in the **About Us** section.

We also have a created the **DHNetwork** for all those interested in research, from the novice or beginner just getting interested in research through those with extensive research experience. Click on **Network** to join and later begin to explore commonalities in research interests, learn from each other about new and ongoing research programs, and participate in collaborative efforts to systematically and purposefully advance dental hygiene practice and education through research.



Research

Research Agendas

1. **ADHA-National Dental Hygiene Research Agenda**
(<http://www.adha.org/research/nra.htm>) - The National Dental Hygiene Research Agenda provides directions to hygienists on priority research areas that can help advance the profession.
2. **NIDCR Strategic Plan 2014-2019**
(<http://www.nidcr.nih.gov/Research/ResearchPriorities/StrategicPlan/>) - The 2009-2013 NIDCR Strategic Plan provides a guide for the Institute's funding decisions and defines the areas that will be closely monitored for key developments and innovations that can be applied to oral, dental and craniofacial health. The Goals and Objectives presented throughout this Plan strike a careful balance between basic and applied research; address workforce issues; and confront the vexing problem of health disparities.

The DHNet (continued)

3. **HEALTHY PEOPLE 2020** (<http://www.healthypeople.gov/2020/default.aspx>) - Healthy People provides science-based, 10-year national objectives for improving the health of all Americans. For 3 decades, Healthy People has established benchmarks and monitored progress over time.
4. **CDC Centers for Disease Control & Prevention** (<http://www.cdc.gov/ORALHEALTH/>) - The CDC's Division of Oral Health (DOH) works to improve the oral health of the nation and reduce inequalities in oral health.
5. **CDHA Canadian Dental Hygienists Association** (http://www.cdha.ca/pdfs/Profession/Policy/research_agenda_102603.pdf) - The goal of the CDHA Research Agenda is improved oral health for all
6. **CIHR (Canadian Institutes of Health Research) Strategic Plan 2009-10 to 2013-14** (<http://www.cihr-irsc.gc.ca/e/39977.html>) - Health Research Roadmap: Creating innovative research for better health and health care. The IMHA supports research to enhance active living, mobility and movement, and oral health; and addresses causes, prevention, screening, diagnosis, treatment, support systems, and palliation for a wide range of conditions related to bones, joints, muscles, connective tissue, skin and teeth.
7. **NCI-National Cancer Institute, NIH** (<http://www.cancer.gov/>) - The NCI is the Federal Government's principal agency for cancer research and training; the National Cancer Program, information dissemination has a requirement to assess the incorporation of state-of-the-art cancer treatments into clinical practice.
8. **OFFICE OF RESEARCH ON WOMEN'S HEALTH** (<http://orwh.od.nih.gov/>) - The Office of Research on Women's Health (ORWH) serves as a focal point for women's health research at the NIH. Established in September 1990 within the Office of the Director.
9. **Surgeon General Report** (<http://www.nidcr.nih.gov/AboutNIDCR/SurgeonGeneral/>) - Healthy People provides science-based, 10-year national objectives for improving the health of all Americans. For 3 decades, Healthy People has established benchmarks and monitored progress over time

Databases

1. **MedlinePlus** (<http://www.nlm.nih.gov/medlineplus/>) - MedlinePlus is the National Institutes of Health's Web site for patients and their families and friends. Produced by the National Library of Medicine, it brings free NIH access to information about diseases, conditions, and wellness issues in language you can understand.
2. **Cochrane Collaboration and Library** (<http://www.cochrane.org/>) - The Cochrane Collaboration is an international network of people helping healthcare providers, policy makers, patients, their advocates and care givers, make well-informed decisions about health care by preparing, updating and promoting the accessibility of Cochrane Reviews (systematic reviews) – over 4,000 so far, published online in The Cochrane Library. They investigate the effects of interventions for prevention, treatment and rehabilitation. They also assess the accuracy of a diagnostic test for a given condition in a specific patient group and setting.
3. **Cochrane Library - Oral Health** Approximately 200 reviews have been or are being completed on a full range of oral health topics.
(<http://www2.cochrane.org/reviews/en/subtopics/84.html>; www.ohg.cochrane.org)
4. **Evidence Based Medicine Bibliography** (<http://www.cche.net/ebcp/ebcpbiblio.htm>) - Links to the Users' Guides to the Medical Literature, and articles on basic statistics, computer software, journals, systematic review series, textbooks, websites and commentaries.

The DHNet (continued)

5. **RxList** (http://www.rxlist.com/drugs/alpha_a.htm) - Information about pharmaceuticals approved for use in the United States.
6. **HerbMed** (<http://www.herbmed.org/>) - Provides hyperlinked access to the scientific data underlying the use of herbs for health.
7. **The Trip Database - Clinical Search Engine** (<http://www.tripdatabase.com/>) - The TRIP Database is a clinical search tool designed to allow health professionals to rapidly identify the highest quality clinical evidence for clinical practice.
8. **Internet Resources for Dentistry** (<http://www.shef.ac.uk/library/subjects/dentir.html>) - The gateways and subject guides included in the following list will lead to more focussed and quality assured information than general Internet search engines for queries relating to dentistry.
9. **ClinicalTrials.gov** (<http://clinicaltrials.gov/>) - ClinicalTrials.gov is a registry of federally and privately supported clinical trials conducted in the United States and around the world. ClinicalTrials.gov gives you information about a trial's purpose, who may participate, locations, and phone numbers for more details.
10. **Medlineplus Drugs, Herbs & Supplements Information** (<http://www.nlm.nih.gov/medlineplus/druginformation.html>) - MedlinePlus is the National Institutes of Health's Web site for patients and their families and friends. Produced by the National Library of Medicine, it brings you information about diseases, conditions, and wellness issues in language you can understand. MedlinePlus offers reliable, up-to-date health information, anytime, anywhere, for free.
11. **Medscape.com** (<http://www.medscape.com>) - Medscape from WebMD offers specialists, primary care physicians, and other health professionals robust and integrated medical information and educational tools. After a 1-time, free registration, Medscape automatically delivers to you a personalized specialty site that best fits your registration profile.
12. **ADA Center for Evidence Based Dentistry** (<http://ebd.ada.org>) - Provides systematically assessed evidence as tools and resources to support clinical decisions: A practical approach to integrating evidence into patient care.
13. **Centre for Evidence Based Medicine** (<http://www.cebm.net/>) - The CEBM's broad aim is to develop, teach and promote evidence-based health care and provide support and resources to health care professionals to help maintain the highest standards of practice.
14. **Centre for Evidence Based Dentistry** (<http://www.cebd.org/>) - The Centre for Evidence-based Dentistry, established in 1995, is an independent body whose aim is to promote the teaching, learning, practice and evaluation of evidence-based dentistry world-wide.
15. **Journal of Evidence Based Dental Practice** (<http://www.journals.elsevier.com/journal-of-evidence-based-dental-practice/>) - The Journal of Evidence-Based Dental Practice presents timely original articles, as well as reviews of articles on the results and outcomes of clinical procedures and treatment. The Journal advocates the use or rejection of a procedure based on solid, clinical evidence found in literature.
16. **EBD - Evidence Based Dentistry** (<http://www.nature.com/ebd/index.html>) - Bridging the gap between research and dental practice, EBD provides a single source of ground breaking issues in Dentistry. The best range of evidence is filtered out from a wide range of sources, presenting clear, comprehensive and easily digestible summaries.

The DHNet (continued)

Funding

1. **ADHA Institute for Oral Health** (<http://www.adha.org/ioh/index.html>) - The ADHA Institute Research Grant Program provides guidance for the research process and financial assistance on a competitive basis to dental hygienists who wish to implement research in dental hygiene.
2. **CDHA & other Canadian Funding Sources** (http://www.cdha.ca/cdha/The_Profession_folder/Research_folder/Funding_Sources_folder/CDHA/The_Profession/Research/Funding_Sources.aspx?hkey=04aaf7a2-5083-4c44-b8db-42a63c8b75df)
CFDHRE exists to enhance the oral health and well-being of Canadians through dental hygiene research and education. The foundation's undertakings include conducting and disseminating research, publishing useful materials, and educating the public.
3. **NCI-National Cancer Institute, NIH** (<http://www.cancer.gov/researchandfunding/priorities>)
4. **Agency for Healthcare Research & Quality** (<http://www.ahrq.gov/fund/>) - The goal of AHRQ research is measurable improvements in American health care, gauged in terms of improved quality of life and patient outcomes, lives saved, and value gained for what we spend. Important new initiatives include comparative effectiveness research on which medical treatments work best for a given condition and research on ways to reduce healthcare-associated infections (HAIs).
5. **HRSA (Health Resources & Services Administration) Health Professions** (<http://bhpr.hrsa.gov/grants/default.htm>) - Grants to improve access to health care by helping training programs address pressing needs across the U.S. health workforce.
6. **FIPSE (Fund for the Improvement of Postsecondary Education)** (<http://www2.ed.gov/about/offices/list/ope/fipse/index.html>) - These projects propose significant reforms and improvements in U.S. postsecondary education and have the potential to serve as national models for reform.
7. **NIDCR-NIH** (<http://www.nidcr.nih.gov/GrantsAndFunding/>) - NIDCR is the Nation's leading funder of oral, dental, and craniofacial research. Approximately 75% of NIDCR's budget goes to the support of grantees at universities, dental schools, and medical schools across the country and around the world.

Training

1. **ADHA Annual Session**, CLL Research Track CE Courses – (<http://www.adha.org>) See ADHA Program Registration
2. **University of Washington** (<http://depts.washington.edu/dphs/suminst/>) - Summer Institute in Clinical Dental Research Methods
3. **ADA Center for Evidence Based Dentistry – Advanced EBD Workshop**, <http://ebd.ada.org/en/education/courses/advanced-evidence-based-dentistry-workshop>
4. **Johns Hopkins Summer Institutes** (http://www.jhsph.edu/Academics/Continuing_Ed/Summer_Institutes.html) - Provide short-term, intensive educational opportunities for public health practitioners and other professionals who are unable to devote full-time status to their studies during the regular academic year. The Summer Institutes also serve as a convenient method for health professionals to further their education in a variety of public health disciplines or to be introduced to a new field of study.

DHNet Resources Related to Practice and Education

Depending on an area of inquiry, resources for Practice and Education help to guide a research project or protocol. Links to related resources are available on the DHNet in the Practice and Education sections. For example, under **Practice**, (<https://dent-web10.usc.edu/dhnet/practice.asp?section=3>) there are resources related to:

Drug Databases, Guidelines & Prevention, Oral Diseases & Conditions, Practice News and Training

Under the **Education** section, (<https://dent-web10.usc.edu/dhnet/education.asp?section=4>) the resources are categorized under the areas of:

Databases, Position Papers, Programs and Training

Registering Your Study with NIH

There are now legal requirements (Section 801 of the Food and Drug Administration Amendments Act, FDAAA801) for investigators of clinical trials of drugs (including biological products) and medical devices to register and submit their summary results to ClinicalTrials.gov. This legislation also includes a requirement that if an “applicable clinical trial” is funded in whole or in part by a grant from any agency of the Department of Health and Human Services, any grant or progress report shall include a certification that the responsible party has made all required submissions for the applicable trial to ClinicalTrials.gov. All applications submitted to the NIH on or after January 25, 2008, which incorporate an applicable clinical trial in their proposed project, are required to register. Failure to do so can result in civil monetary penalties and withholding or recovery of grant funds (<http://grants.nih.gov/grants/guide/notice-files/NOT-OD-08-023.html>)

In addition, to the legal requirement, the International Committee of Medical Journal Editors (ICMJE) requires trial registration as a condition for the publication of research results generated by a clinical trial. They recommend that registration occur at or before the time of first patient enrollment as a condition of consideration for publication. For additional information and a listing of journals that require registration see: (<http://www.icmje.org/recommendations/browse/publishing-and-editorial-issues/clinical-trial-registration.html>)

ClinicalTrials.gov is a service of the NIH. See their website (<http://clinicaltrials.gov>) for information on the purpose of registering clinical trials and submitting results and the procedures for how to do so.

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We wish to thank all of the Advisory Board members who contributed to this Toolkit by sharing the resources that they have found helpful in their careers in conducting and fostering research and evidence-based decision-making. We hope that you find this document helpful in your work and encourage you to share resources with us that may not be included so that we can incorporate them in future updates. Also, please note that website addresses are current as of this compilation, however as we all have experienced, they often change.

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Sincerely,

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